Area Fire Weapons in a Precision Environment: Field Artillery in the MOUT Fight

EWS 2005

Subject Area Artillery

Area Fire Weapons in a Precision Environment:

Field Artillery in the MOUT Fight

Submitted by CPT Patrick Cooley

to

Major Adkinson, CG 2

January 05

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
2005		**00-00-2005 to 00-00-2005**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Area Fire Weapons in a Precision Environment: Field Artillery in the MOUT Fight	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **United States Marine Corps,Command and Staff College, Marine Corps University,2076 South Street, Marine Corps Combat Development Command,Quantico,VA,22134-5068**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**10**	

Advances in rocket technology have far surpassed cannon technological advances in the last twenty years. Rockets are more lethal, accurate and offer increased ranges with decreased crew sizes and logistical requirements. On the modern battlefield weapon systems must become increasingly lethal while decreasing manning and logistical requirements or they become obsolete. In the urban environment military force must minimize collateral damage and deliver sufficient fire power to neutralize targets. Rocket munitions fulfill this requirement better than cannon munitions do. Cannon artillery cannot keep pace with the accuracy and lethality offered by current and future generations of rocket munitions. Given the accelerating advances in rocket guidance technology and the extended range capability of rockets over cannons, the current rocket and missile systems provide a decided advantage over conventional cannon delivered munitions in the urban environment.

During military operations on urban terrain (MOUT), precision weapon systems become inherently more valuable due to their high probability of hit and their lower collateral damage to surrounding areas. The field artillery has traditionally been viewed as an area fire weapon capable of delivering massive amounts of firepower to a specific location from long distances. However, in an urban environment the ability of field artillery

cannon systems to deliver precision fire support and minimize collateral damage is difficult at best.

CANNON PRECISION MUNITIONS

The only current 155mm precision munition available to Field Artillery units is the M712 Copperhead, fielded in 1981. The Copperhead is a laser guided munition with a reliability rate of eighty-four percent when fired in conjunction with a laser designator.[1] On 20 December 2004 the Commander of USAJMC at Rock Island Arsenal issued a firing report that all remaining Copperhead rounds in the inventory could only be fired in the ballistic mode[2], negating the precision of the munition by not allowing it to fly in the glide mode. In addition, the Copperhead round was last produced in 1984, the Army and Marine Corps have been firing the originally purchased 7,695. The Copperhead is thus being phased out in favor of new guided munitions due to the Copperhead's age and low inventory levels.

The current cannon-borne precision munition in development is the Raytheon XM982 Excalibur global positioning system (GPS)/inertial navigation-guided extended-range 155mm scheduled for fielding in 2006. The Excalibur production specifications dictate that the round have a 40km range and a circular error

[1] Department of the Army Historical Summary: FY 1982
[2] 202034ZDEC04 FROM CDR USAJMC ROCK ISL IL//SFSJM-QAS//

probability (CEP)[3] of only 10m.[4] The Excalibur is also required to be compatible with both the M109A6 Paladin and the new M777 cannon systems.

ROCKET MUNITIONS

Rocket delivered munitions have increased in both accuracy and range over their cannon delivered counterparts in the last twenty years. The latest in rocket munition technology is Lockheed Martin's guided multiple launch rocket system (GLMRS) for the new M142 high mobility artillery rocket system (HIMARS) which is currently in low rate initial production. The extended range GLMRS can reach over 70km and carries a global position system (GPS) internal guidance package. HIMARS successfully fired the new GLMRS in April 2004 at a range of over 70km with a deviation from the target of less than one meter. Initial operating capability (IOC) is planned for 2005.[5] GMLRS is an all-weather; precision-guided rocket that provides increased accuracy thus reducing the number of rockets necessary to defeat current targets by eighty percent.[6]

CANNON AND ROCKET COMPARISON

[3] CEP is the probability of a single round falling in a circle with a specified radius
[4] http://www.globalsecurity.org/military/systems/munitions/m982-155.htm
[5] http://www.army-technology.com/projects/himars/
[6] http://www.missilesandfirecontrol.com/our_news/pressreleases/04pressrelease/051104_GMLRSHimars.htm

Cannon-borne munitions from the M777 have a maximum range of 30km. Without extended range munitions, its maximum range is 24.7km. With extended range munitions some of the high explosives are traded for the rocket booster, thus degrading the effects of the extended range munitions. GLMRS maximum range is over 70km, and a GLMRS can reach maximum range without any degradation in effects. This allows the GLMRS to reach more than double the range of cannon fire, without sacrificing any lethality for range. In actuality the GLRMS boasts an eighty percent increase in lethality over conventional high explosive rounds; making a single HIMARS battery equivalent to almost an entire M777 Battalion.

This increase in munitions range and lethality allows a maneuver commander to cover more area with a single firing battery than could be covered with three cannon equipped artillery batteries. Instead of dispersing batteries across the battlefield to cover the entire area of operations (AO), a commander could cover the entire area with one battery of HIMARS maintaining responsiveness and lethality. In dispersed operations that capability will allow continuous coverage of a highly accurate and deadly fire support system from one centralized location, reducing the overall foot print of artillery systems in the AO and freeing up artillery personnel

to conduct other non-traditional missions such as force protection and convoy escort duties.

PERSONNEL AND LOGISTICAL REQUIREMENTS

The new M777 155mm lightweight howitzer will begin replacing the older M198 155mm howitzers in late 2005. The new M777 will only require a seven-man crew to operate[7], with a five-soldier minimum. At the same time the M142 HIMARS only requires a crew of three operators and can work with a minimum of one man. In terms of personnel required to operate weapon systems the HIMARS far outclasses the newest cannon artillery system. With less personnel to operate and a smaller foot print[8] on the ground the HIMARS offers the maneuver commander a significant increase in capabilities verses a cannon weapon system in both logistical support and manning requirements.

Due to different ammunition packaging amounts[9] cannon firing units spend exorbitant amounts of time breaking down ammunition into useable amounts and matching the correct round, powders, and fuzes amounts together. Cannon powders and projectiles come in different package sizes and take up more or less room than a

[7] The older M198 155MM howitzer had a ten man crew but could be fired with six men
[8] "Foot Print" refers to the space on the ground required for the equipment, personnel and any other unit space requirements
[9] Cannon-bourn munitions require separate fuzes, powders and projectiles and each of these components is packed in different amounts. Artillery rounds typically come in "8 Packs" that are banded together into 24 round flats. Fuzes come in amounts of 8 fuzes per ammunition can; however powders can come in packs of 25, 30 or 60.

unit’s normal authorized basic load (ABL) on ammunition trucks depending on the type and number of complete rounds[10] being transported. Increases in hauling requirements and logistical planning for cannon firing units and the complexity of supporting them is thus further exacerbated. Further complicating this situation is the fat that different powders have different ranges and an artillery unit must predict what ranges it will need to be firing at in order to maximize that specific ammunition. The ultimate result is to further limit the maneuver commander in planning the locations of his firing units because the artillery batteries must be positioned at optimal ammunition ranges from a commanders objective.

Rockets come as complete rounds in pods of six rockets per pod; once a pod is empty a HIMARS can reload a new pod in less than two minutes. Rocket pods are all one standard size and the same number of rocket pods can always be loaded on an ammunition truck. Current generation ammunition trucks with trailers can carry a total of six pods each, when added to the pod already loaded in the HIMARS this makes a total of seven pods for a total of fourty-two rockets per launcher. Given their standardized ammunition hauling capability, the HIMARS battery

[10] One complete round is considered one round, powder and fuze.

offers simplified logistics planning and coordination with decreased personnel requirements to manage their supply.

COUNTER ARGUMENTS

Proponents of cannon-borne munitions and weapon systems will be quick to point out several facts and observations that can be interpreted as giving strength to the cannon argument. The first point they will bring out is the overall concentration of artillery assets in one location thus creating one high payoff target for the enemy to attack. However, in the context of current MOUT operations, United States forces are all equally concentrated on forward operating bases (FOB). In MOUT operations US forces traditionally gravitate towards existing logistical infrastructure to include airfields and military complexes. Occupying preexisting infrastructure decreases the amount of time required to establish facilities and the amount of money required to improve them. In an effort to cut costs and logistical requirements, units naturally gravitate towards existing infrastructure and the concentration of forces at single locations is inevitable, thus rendering their objections null and void.

Traditional cannon proponents may argue that the high cost of individual rocket munitions makes the rocket option cost prohibitive. When viewed from the narrow prospective of simple

cost per round the cannon proponents are correct; rockets simply cost more than cannon munitions. The cost of firing multiple rounds of cannon munitions to accomplish the same effects of one rocket, but even this is only simple mathematics. Even more costly is the undeterminable cost of missing the target and allowing it to escape and fight another day, rather than neutralizing it the first time and preventing the targets continued effect on US forces.

While the Excalibur is an impressive munition, its capabilities are generations behind those of the GLMRS. The Excalibur offers a range of only 40km, 30 km short of the 70km range of GLMRS. The CEP of an Excalibur is ten times greater than the CEP of a GLMRS. While individual round statistics are enough to quiet most cannon proponents, this still ignores the logistical and manning requirements to launch these rounds. The GLMRS can be fired with only one crew member in the launcher, while the cannon still requires a minimum of five personnel. By now taking the logistical argument beyond simply looking at the costs of the munitions involved we can see that there are four more men in the cannon example who need food, water and supplies verses one man for a GLMRS.

CONCLUSION

In an urban environment a GLMRS equipped HIMARS battery offers the maneuver commander significant advantages over a traditional cannon battery. From the perspective of lethality, responsiveness, and manning and logistical requirements a rocket battery is the logical choice for a commander in the urban environment. The GLMRS offers a maneuver commander greater range over conventional cannon munitions and increased accuracy while requiring less men to operate effectively. The increased capabilities of the GLMRS offer a maneuver commander more options for the employment of forces while at the same time stream lining the logistical trains. The benefits of a GLMRS equipped HIMARS battery are achieved without sacrificing any overall fire support responsiveness or coverage because of advances in rocket technology. All of these advantages become amplified when placed in the context of urban operations where a premium is placed on the accuracy of individual rounds and the limiting of collateral damage. In the end, rocket munitions fulfill all the requirements of urban operations better than cannon munitions do; at less of an overall cost.